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STUDIES IN MYXOPHYCEAE. I.

BY

FRANCIS DROUET

CURATOR OF CRYPTOGAMIC BOTANY

BOTANICAL SERIES

FIELD MUSEUM OF NATURAL HISTORY

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Specimens cited here are to be found in herbaria as indicated by the following abbreviations: C, Herbarium of the University of California; D, Herbarium of Francis Drouet; F, Farlow Herbarium of Harvard University; FM, Cryptogamic Herbarium, Field Museum of Natural History; N, Herbarium of the New York Botanical Garden; P, Herbarium of the University of Pennsylvania; T, Herbarium of William Randolph Taylor; U, United States National Herbarium.

POLYCYSTIS **glauca** (Wolle) Drouet & W. A. Daily, **comb. nov.** *Anacystis glauca* Wolle Bull. Torr. Club 6: 182. 1877. *Microcystis glauca* (Wolle) Drouet & Daily Field Mus. Bot. Ser. 20: 73. 1939.—This transfer is made necessary in the revival of the generic name *Polycystis* Kütz.; see Daily in Amer. Midl. Nat. vol. 27. 1942.

APHANOCAPSA **Farlowiana** Drouet & Daily, **sp. nov.** Plantae aquaticae, natantes, sphaericae vel ovoideae saepe tuberculatae, duriusculae, laete aerugineae, diametro 1–5 mm. crassae, gelatina hyalina et firma; cellulis sphaericis, diametro 2 μ ad 3 μ crassis, aerugineis, protoplasmate granuloso. Fig. 4.—Floating in shallow fresh water. This species has cells similar in size to those of *A. Richteriana* Hieron. but can be readily distinguished from the latter by the shape and consistency of the mass. It is named in honor of the late Professor William G. Farlow of Harvard University. Specimens seen, MASSACHUSETTS: floating in Oyster pond, Falmouth, *R. N. Webster & Drouet 2156*, July 1938 (TYPE in herb. F. Drouet; isotypes, C, F, N), idem, *V. Trombetta & Drouet 2184*, Sept. 1937 (D), idem, *J. Bader*, July 1938 (D); Hammonds pond, Newton, *W. G. Farlow*, Oct. 1890 (C, F, FM).

PLEUROCAPSA **Kerneri** (Hansg.) Drouet, **comb. nov.** *Xenococcus Kerneri* Hansg. Physiol. & Algol. Stud. 111. 1887. *X. acervatus* Setch. & Gardn. Univ. Calif. Publ. Bot. 6: 459. 1918. *Microcystis splendens* Hollenb. Bull. Torr. Club 66: 493. 1939. *M. ovalis* Hollenb. loc. cit. 1939. Plantae microscopicae, epiphyticae, aerugineae, primum pulvinatae demum hemisphaericae usque ad fere sphaericae, matrice gelatinosa hyalina vel luteola non aut vix lamellosa; cellulis aerugineis, sphaericis vel hemisphaericis vel polyhedroideis, vulgo ad 6 μ (raro usque ad 15 μ) crassis, protoplasmate vix granuloso.—Epiphytic on other algae in fresh and

brackish water, rarely in marine water. Hansgirg's name *Xenococcus Kerneri* is here accepted on the basis of specimens interpreted thus by Ed. Bornet in the Farlow Herbarium. The plants in these specimens have cells separated by gelatinous material and are therefore quite different from those of species of Xenococcus and Dermocarpa, which possess distinct cell walls and do not produce a gelatinous matrix. The type material of *Xenococcus acervatus* Setch. & Gardn. distributed as *Pleurocapsa amethystea* var. *Schmidtii* Gardn. in Phyc. Bor.-amer. 1704 is excellent material of *Pleurocapsa Kerneri* as described above. The isotypic specimen of *Microcystis splendens* Hollenb. and *M. ovalis* Hollenb. in the Cryptogamic Herbarium of Field Museum consists of plants developed in culture which I can explain only as peculiar growths of this species under special conditions, some of the cells having become greatly enlarged and subsequently divided into numerous gonidia. Specimens seen, MAINE: on Rhodochorton and Sphacelaria, Eagle island, *F. S. Collins 2113*, July 1891 (F). MASSACHUSETTS: on Cladophora, Magnolia, *W. G. Farlow*, Sept. 1903 (F, FM); tide pool, Cohasset, *Collins*, Oct. 1901 (F; as *Xenococcus Kerneri* in Phyc. Bor.-amer. 952, FM); on Rhizoclonium, clay pit, Medford, *Collins 5509*, Sept. 1906 (F). NEW YORK: on *Cladophora expansa* in pool in salt marshes, Cold Spring Harbor, *L. N. Johnson 1055*, Aug. 1894 (F). CALIFORNIA: in pools in salt marsh near Berkeley, *N. L. Gardner*, Nov. 1905 (as *Pleurocapsa amethystea* var. *Schmidtii* in Phyc. Bor.-amer. 1704, isotype of *Xenococcus acervatus* Setch. & Gardn., FM); in old cultures of phaeophyceae, La Verne, *G. J. Hollenberg 2179c, d*, Dec. 1937 (isotype of *Microcystis splendens* Hollenb. and *M. ovalis* Hollenb., FM). SONORA: on back of a turtle in a pool, Unión, Hermosillo, *Drouet & D. Richards 3020*, Nov. 1939 (FM).

PLEUROCAPSA **Deeveyi** Drouet, **sp. nov.** Plantae microscopicae planctonicae multicellulares plus minusve sphaericae, usque ad 200 μ crassae, matrice gelatinosa hyalina demum luteola, arcta; cellulis aerugineis vel luteolis, polyhedroideis, raro hemisphaericis vel sphaericis, compactis, usque ad 7 μ crassis, protoplasmate haud granuloso.—Planktonic in brackish water. The habit of the plants reminds one forcibly of that of *Gomphosphaeria aponina* Kütz. and of *Botryococcus Braunii* Kütz., but the detailed structure is very different from that of either. It is possible that *Pleurocapsa Deeveyi* is a peculiar growth-form of *P. fuliginosa* Hauck, a species to be expected in such brackish water. The new species is named in honor of Dr. E. S. Deevey of the Rice Institute. Specimens seen,

TEXAS: La Sal Viejo, Willoughby county, *Deevey*, Jan. 1941 (TYPE in Cryptogamic Herbarium of Field Museum); La Sal del Rey, Hidalgo county, *Deevey*, Nov. 1941 (FM).

CHROOCOCCUS **sonorensis** Drouet & Daily, **sp. nov.** Plantae microscopicae 1–20-cellulares, irregulariter sphaericae vel ovoideae saepe lobatae, inter alias algas aquaticas crescentes, matrice gelatinosa hyalina homogenea non lamellosa, externe arcte delimitata vel diffluenti; cellulis aerugineis sphaericis vel hemisphaericis, distantibus, 3 μ usque ad 7 μ crassis, protoplasmate haud granuloso. Fig. 1.—Mixed with other algae in brackish water. The species is similar to the planktonic *C. limneticus* Lemm. of fresh water, but the plants are smaller and often lobate, and the cells seldom remain hemispherical for a long period as do those of *C. limneticus*. Specimens seen, SONORA: in pools of brackish water at the beach 4 km. east of Guaymas, *Drouet & D. Richards 3296* (FM), *3298* (TYPE in Cryptogamic Herbarium of Field Museum), Dec. 1939.

CHROOCOCCUS **Prescottii** Drouet & Daily, **sp. nov.** Plantae microscopicae praecipuius cubicae, haud raro polydehroideae vel plus minusve sphaericae, 1–32-cellulares, laete aeruginosae, inter alias algas aquaticas crescentes, matrice gelatinosa hyalina homogenea vel obscure lamellosa, externe arcte delimitata vel diffluenti; cellulis aerugineis, sphaericis vel fere hemisphaericis, 4 μ usque ad 7 μ crassis, protoplasmate homogeneo vel sparse tenui-granuloso. Fig. 2—In shallow fresh water. This is the organism referred to by Prescott & Croasdale, Trans. Amer. Microsc. Soc. 56: 270, f. 9 (1937), under the name *Eucapsis alpina*. Plants of *E. alpina* Clem. & Shantz (if we can judge by the meager type material in the United States National Herbarium) have much smaller cells than do those of *Chroococcus Prescottii;* these cells are of a size and compact arrangement characteristic of *Merismopoedia glauca* (Ehrenb.) Kütz.; the gelatinous matrix is homogeneous. *Chroococcus Prescottii*, on the other hand, has large cells widely spaced in a gelatinous matrix that is often obscurely lamellose. The plants are very similar to those of *C. limneticus* Lemm., but with more regular arrangement of cells and less broad gelatinous matrix. This new species is named in honor of Professor Gerald W. Prescott of Albion College. Specimens seen, MASSACHUSETTS: Desmid Haven, West Falmouth, *H. Croasdale*, July 1935 (D), idem, *C. M. Palmer*, Aug. 1937 (TYPE in herb. F. Drouet; isotypes, C, F, N). MICHIGAN: Bryant's bog near Douglas lake, Cheboygan county, *H. A. Gleason Jr.*, July 1935 (T).

ENTOPHYSALIS **cryptarum** (Farl.) Drouet, **comb. nov.** *Chroothece (?) cryptarum* Farl. in Coll. Hold. & Setch. Phyc. Bor.-amer. 16: 752. 1900. Stratum gelatinosum, laete aerugineum vel luteolum vel fuscum vel roseum, 3—4 mm. crassum, filis 1-pluri-cellularibus, tortuosis, compacte aggregatis, ramosis; vaginis hyalinis vel luteis, arcte delimitatis, conspicue lamellosis; cellulis aerugineis, sphaericis vel cylindricis, 2 μ ad 4 μ crassis, praecipuius ad 5 μ longis, haud raro usque ad 6 μ longis, protoplasmate non granuloso.—On wet limestone. As noted by Farlow, this species is reminiscent of the the green alga Urococcus; in habit and in certain morphological details it resembles *U. Hookerianus* (Hass.) Kütz. Because of the strictly filamentous structure of the plants, it is placed here in Entophysalis. Specimens seen, BERMUDA: in caves by the seashore, *W. G. Farlow*, Jan. 1900 (TYPE in Farlow Herbarium; isotype in Phyc. Bor.-amer. 752, FM); Aggar's cave, *Farlow*, 1881 (F). PUERTO RICO: high littoral in sluice-way, San Juan, *M. A. Howe 2130*, May 1903 (F). JAMAICA: on wall of a littoral cavern below Fort Clarence near Kingston, *Howe 4651*, Dec. 1906 (FM). GUATEMALA: rocks and cliff, Rio Dulce above Livingston, Dept. Izabal, *J. A. Steyermark 39439, 39440*, Apr. 1940 (FM). VENEZUELA: wet rocks, Margarita island, *A. F. Blakeslee*, 1903 (F).

DERMOCARPA **Gardneriana** Drouet, **sp. nov.** Stratum violaceum compactum, plantis saepe inter alias algas sedentarias crescentibus; cellulis plus minusve compactis, aerugineis vel violaceis, inferne sphaericis vel cum mutua pressione polyhedroideis, vulgo circa 3 μ ad 10 μ crassis, superne crassioribus atque haud raro perfecte sphaericis diametro usque ad 40 μ crassis, protoplasmate homogeneo, membrana cellulae tenui hyalina; cellulis grandis in pluribus gonidiis dividentibus.—On rocks and shells in fresh water. This species, with its compact strata of many spherical cells, resembles closely *D. violacea* Crouan of marine habitats. The plants are readily parasitized by fungi. This species is named in memory of the late Professor Nathaniel L. Gardner of the University of California. Specimens seen, FLORIDA: on stones, Gainesville, *M. A. Brannon 40*, Feb. 1942 (FM); in a collecting bottle, Gainesville, *Brannon 47*, Mar. 1942 (FM). NEBRASKA: on pebbles in creek bed 8 miles north of Max, Dundy county, *W. Kiener 10595*, July 1941 (FM). CALIFORNIA: culture of algae from Lake Merced, San Francisco, *Gardner 6837*, Oct. 1931 (TYPE in Cryptogamic Herbarium of Field Museum; isotype, C); on shells, Mountain lake, San Francisco, *W. J. V. Osterhout & Gardner*, June 1902 (as *Pleurocapsa concharum* in Phyc. Bor.-amer. 1051, FM); on dripping rocks in hot water, the Geysers,

Sonoma county, *Gardner & L. Bonar 7519*, Aug. 1933 (C, FM); in warm water on a cement runway, Seigler hot springs, Napa county, *Gardner 7474*, Aug. 1933 (C, FM).

DERMOCARPA **Setchellii** Drouet, **sp. nov.** Stratum violaceum, tenue, late effusum, cellulis compactis, violaceis, inferne sphaericis vel polyhedroideis, vulgo circa 3 μ usque ad 6 μ crassis, superiore crassioribus atque ovoideis vel pyriformibus vel plus minusve cylindraceis usque ad 15 μ crassis et 25 μ longis, protoplasmate homogeneo, membrana cellulae tenui hyalina; cellulis grandis in pluribus gonidiis dividentibus.—On rocks in warm fresh water. The ovoid and pyriform upper cells in the stratum distinguish this species easily from *D. Gardneriana* and from *D. violacea* Crouan. It is named in honor of Professor William A. Setchell of the University of California. Specimens seen, CALIFORNIA: Harlem hot springs, San Bernardino county, *Setchell 1560*, Dec. 1896 (TYPE in Cryptogamic Herbarium of Field Museum; isotype, C).

DERMOCARPA **Hollenbergii** Drouet, **sp. nov.** Cellulae solitariae vel aggregatae, epiphyticae, aerugineae vel violaceae, sphaericae vel cum mutua pressione polyhedroideae, diametro vulgo 3 μ ad 15 μ (usque ad 20 μ) crassae, protoplasmate homogeneo vel sparse grosse-granuloso, membrana cellulae tenui hyalina; cellulis grandis in pluribus gonidiis dividentibus.—Epiphytic on filamentous algae in fresh water. This species resembles most closely *D. Schousboei* (Thur.) Born. of brackish and marine waters. It is named in honor of Professor George J. Hollenberg of the University of Redlands. One collection seen, CALIFORNIA: on Rhizoclonium in a small pond at Old Woman springs, Mojave desert, *Hollenberg 2084*, May 1937 (TYPE in herb. F. Drouet).

DERMOCARPA **Solheimii** Drouet, **sp. nov.** Cellulae epiphyticae aerugineae, solitariae vel aggregatae, sphaericae vel subcylindraceae vel subpyriformes, diametro vulgo 2 μ ad 4 μ (usque ad 5 μ) crassae, ad 5 μ longae, protoplasmate homogeneo, membrana cellulae tenui indistincta hyalina; cellulis grandis in paucis gonidiis dividentibus. —Epiphytic on larger algae and on roots of vascular plants in fresh water. This species is rather similar to but smaller than the marine *D. Schousboei* (Thur.) Born. and the freshwater *D. Hollenbergii* Drouet. It is named in honor of Professor W. G. Solheim of the University of Wyoming. Specimens seen, WYOMING: in stream in an open meadow above University Camp, Medicine Bow national forest, *Solheim 53*, June 1933 (TYPE in Cryptogamic Herbarium of Field Museum), idem *108*, July 1933 (FM).

DERMOCARPA **minuta** Drouet, **sp. nov.** Cellulae epiphyticae aerugineae solitariae vel aggregatae, sphaericae ad subcylindraceae vel ovoidea, diametro 1 μ ad 3 μ crassae, usque ad 4 μ longae, protoplasmate homogeneo, membrana cellulae indistincta hyalina.—Epiphytic on filamentous algae in fresh water. This is the smallest of the species of Dermocarpa; if the cells were not of so brilliant a blue-green color they might well be interpreted as bacteria. *D. minuta* is related morphologically to *D. Solheimii* described above and *D. Schousboei* (Thur.) Born. Specimens seen, CALIFORNIA: culture of algae from Tiburon, Marin county, *N. L. Gardner 6916*, Oct. 1931 (TYPE in Cryptogamic Herbarium of Field Museum; isotype, C); in an aquarium, University of California, Berkeley, *Gardner 8012*, Nov. 1936 (C, FM).

FREMYELLA **striatula** (Hy) Drouet, **comb. nov.** *Microchaete striatula* Hy Journ. de Bot. 1: 193. 1887. *Leptobasis striatula* (Hy) Elenk. Bull. Jard. Bot. Imp. Pierre le Grand 15: 21. 1915.—J. DeToni in Noter. Nomencl. Algol. VIII (1936) proposed the generic name *Fremyella* to supplant the preoccupied *Microchaete* Thur. ex Born. & Flah.

FREMYELLA **longifila** (W. R. Tayl.) Drouet, **comb. nov.** *Calothrix longifila* W. R. Tayl. Carnegie Inst. Wash. Papers Tortugas Lab. 25: 51, pl. 2, f. 8. 1928.—The type of this species in herb. Wm. R. Taylor (FLORIDA: on Cladophora and Chaetomorpha at moat, Garden key, Dry Tortugas, *Taylor 134*, June 1924) contains filaments of a species more properly referred to as a member of the genus Fremyella than one of Calothrix, as the author's description and figure indicate.

PORPHYROSIPHON **Velasquezii** Drouet, **sp. nov.** Stratum aerugineum vel fusco-viride, crustosum, late expansum, filis longis, inferne tortuosis et compacte intertextis, superne in fasciculos breves coalitis; vaginis primum hyalinis demum pallide roseis et fusco-rubris, tenuibus, inconspicue lamellosis, chlorozincico iodurato caerulescentibus; trichomatibus aerugineis, 3 μ ad 5 μ crassis, ad genicula paullo constrictis, ad apices leviter attenuatis; articulis diametro usque ad duplo longioribus, dissepimentis pellucidis non granulatis, protoplasmate aerugineo tenui-granuloso; cellula apicali conica, membrana superna non incrassata. Fig.—5. Forming crusts on soil wet intermittently with fresh water. The trichomes are smaller than those of *P. fuscus* Gom. and, unlike those of the latter species, are constricted at the cross-walls. This species is named in honor of Dr. Gregorio T. Velasquez of the University of the

Philippines. Specimens seen, PHILIPPINES: side of the campus usually wet with fresh water from the laboratory, Biological Station, Puerto Galera, Mindoro, *Velasquez 1077*, May 1941 (TYPE in Cryptogamic Herbarium of Field Museum); along the path at Dulangan, Puerto Galera, Mindoro, *Velasquez 1093*, May 1941 (FM); along the sidewalk of Pennsylvania street, Ermite, Manila, *Velasquez 98*, Nov. 1939 (FM).

SCHIZOTHRIX **rivularis** (Wolle) Drouet, **comb. nov.** *Lyngbya Phormidium* var. *rivularis* Wolle ex Forti Syll. Myxophyc. 304. 1907; Wolle Fresh Water Alg. U. S. 299, pl. cci, f. 21. 1887. *Symploca Muscorum* var. *rivularis* Tild. ex Forti loc. cit. 1907. Caespites molles gelatinosae fasciculatae ad 10 cm. altae, superne aerugineae vel violaceae, intus et inferne decoloratae, vaginis hyalinis, superne tenuibus, inferne crassis, saepe omnino diffluentibus, chlorozincico iodurato laete caerulescentibus; trichomatibus aerugineis vel roseis, fragilibus, facile disintegrantibus, 5 μ ad 11 μ crassis, ad genicula constrictis, ad apices attenuatis et conicis; articulis subquadratis, plus minusve brevioribus vel longioribus, dissepimentis non granulatis, protoplasmate granulos refringentes majores continenti; cellula apicali longe et obtuse conica.—On rocks, larger plants, and other substrata in running fresh water. This is a very delicate species of Gomont's section *Inactis*, related morphologically to *S. tinctoria* Gom. and *S. mexicana* Gom. Unless fresh material is dried very rapidly, the trichomes disintegrate and stain the mounting paper violet. This fact led me to infer in Field Mus. Bot. Ser. 20: 54 (1939) that Wolle's original specimens were impossible to identify with known species of Myxophyceae. In many respects *S. rivularis* reminds one of *Phormidium tinctorium* Gom., especially in plants with the sheaths totally diffluent. The brilliantly blue color produced in the sheath material during treatment with chlor-zinc-iodine is very characteristic of *Schizothrix rivularis* but never seen in *Phormidium tinctorium*. Moreover, in the latter the apices of the trichomes are short-conical; in the former they are long-attenuate and very similar to those of *Schizothrix purpurascens* Gom. The specimens distributed as *Symploca Muscorum* var. *rivularis* in Tild. Amer. Alg. 67 are referred to below under *Lyngbya Giuseppei*. Specimens of *Schizothrix rivularis* seen, QUEBEC: attached to water plants in the St. Lawrence river, Longueuil near Montreal, *J. Brunel 31*, Aug. 1930 (FM); Back river near Montreal, *Brunel 57*, Sept. 1930 (FM). PENNSYLVANIA: attached to stones in the Lehigh river, *F. Wolle*, 1878 (TYPE in Herbarium of the University of Pennsylvania), idem July 1879 (F, N, P). VIRGINIA: attached to sub-

merged debris in Wolf creek about 5 miles east of Rocky Gap, Bland county, *E. S. Luttrell & J. C. Strickland 1003*, Aug. 1941 (FM). OHIO: wet rocks of waterfall, Burnet Woods lake, Cincinnati, *L. Lillick & Lee 260*, Oct. 1933 (D). WISCONSIN: Plum creek, Sayner fish hatchery, Vilas county, *G. W. Prescott 3w33*, Aug. 1938 (FM); Barber lake, Chippewa drainage, Sawyer county, *Prescott 3w197*, Aug. 1938 (FM).

SCHIZOTHRIX **roseola** (Gardn.) Drouet, **comb. nov.** *Symploca roseola* Gardn. Mem. N. Y. Bot. Gard. 7: 49. 1927. *Leptothrix symplocoides* Dickie Journ. Linn. Soc. Bot. 15: 240. 1876 [not *Schizothrix symplocoides* (Gardn.) Geitl. Rabenh. Krypt.-Fl. 14: 1078. 1932]. *Schizothrix rosea* Gardn. N. Y. Acad. Sci. Sci. Surv. Porto Rico 8: 287. 1932 [not Gardn. Mem. N. Y. Bot. Gard. 7: 53 1927]. Stratum roseum vel fuscum, crustaceum, filis tenuibus, tortuosis, flexilibus, superne in fasciculos erectes vel repentes coalitis, inferne pseudoramosis; vaginis primum hyalinis et tenuibus demum roseis vel fusco-rubris et crassioribus, erosis, chlorozincico iodurato caerulescentibus; trichomatibus aerugineis, 1 μ ad 2.5 μ crassis, cylindraceis, ad genicula passim leviter constrictis, ad apices non attenuatis; cellulis subquadratis vel diametro longioribus, dissepimentis interdum granulatis, protoplasmate praecipue homogeneo; cellula apicali rotundata.—On rocks and soil periodically wet with fresh water. This species belongs in Gomont's section Chromosiphon with other species possessing red sheaths. Although in Amer. Journ. Bot. 25: 665 (1938) I cited *Leptothrix symplocoides* Dickie as a synonym of *Schizothrix lardacea* Gom., further studies of the type material show that the sheaths are red in older and exposed parts of the mass. Gardner described similar material from Puerto Rico in 1927 under the name *Symploca roseola*. Another specimen of the same thing is cited by him as the type of *Schizothrix rosea* in his 1932 paper in correcting an editorial error in his 1927 paper wherein the intended description of *S. rosea* was omitted and that of his *S. chalybea minor*, Sci. Surv. Porto Rico 8: 287 (1932) [which I interpret from the original specimens as typical *S. purpurascens* var. *cruenta* Gom.] was substituted in its place. *S. rosea* Gardn. as published in Mem. N. Y. Bot. Gard. 7: 53 (1927) must be regarded (even in the most liberal and sympathetic interpretation) strictly as having priority over *S. chalybea minor* Gardn. and as constituting an earlier homonym of *S. rosea* Gardn., Sci. Surv. Porto Rico 8: 287 (1932). Geitler in Rabenh. Krypt.-Fl. 14: 1101 (1932) has written a description for *S. rosea* Gardn. which applies to neither of the type specimens referred to by Gardner. Specimens seen, FLORIDA: on moist sand,

region of Hendry creek about 10 miles south of Fort Myers, Lee county, *P. C. Standley 73463*, Mar. 1940 (FM). ALABAMA: Auburn, Lee county, *C. L. Pollard & W. R. Maxon 64*, July 1900 (FM, U). WYOMING: hot lake deposit, Fountain geyser basin, Yellowstone National Park, *W. A. Setchell*, 1898 (C, FM). PUERTO RICO: 10 km. north of Utuado, *N. Willie 1032b* (isotype of *Symploca roseola* Gardn., C); Mayaguez, *Wille 880c* (isotype of *S. rosea* Gardn. 1932, C, FM). GUATEMALA: on muddy bank near Puerto Barrios, Dept. Izabal, *Standley 72569a*, Apr.–May 1939 (FM). NETHERLANDS EAST INDIES: fumarole of volcano, Gunong Api, Banda islands, *H. N. Moseley*, Challenger Expedition (TYPE of *Leptothrix symplocoides* Dickie in British Museum (Natural History)).

SCHIZOTHRIX **Giuseppei** Drouet, **nom. nov.** *Microcoleus sociatus* var. *minor* Gardn. Mem. N. Y. Bot. Gard. 7: 57, pl. 11, f. 6. 1927 [not Gardn. ibid. 7: 54. 1927]. Stratum aerugineum vel nigro-aerugineum, crustaceum, filis longis fasciculatim ramificantibus, inferne intertextis, superne in fasciculos erectos repentesve saepe tortos coalitis; vaginis primum hyalinis demum interne pallide caeruleis vel chalybeis, latis, lamellosis, ambitu erosis, chlorozincico iodurato laete caerulescentibus; trichomatibus aerugineis vel luteolo-aerugineis, longis, rectis, fragilibus, 2 μ ad 4 μ crassis, ad genicula non constrictis, ad apices abrupte attenuatis et acuminatis, articulis diametro usque ad 3-plo longioribus, dissepimentis haud granulatis, protoplasmate non aut vix granuloso, cellula apicali longe et plus minusve acute conica.—On soil and rocks wet intermittently with fresh water. This species belongs with other blue-sheathed species of Gomont's Section *Chromosiphon*. The new name, in honor of Dr. Giuseppe DeToni of Brescia, is proposed to replace the second of the two *Microcoleus sociatus* vars. *minor* published by Gardner in the same paper. It is true that five years later Gardner in Sci. Surv. Porto Rico 8: 286 (1932) recorded the trinomial *Schizothrix thelephoroides minor* to supplant the *Microcoleus sociatus* var. *minor* of Mem. N. Y. Bot. Gard. 7: 54 (the type material of which proves to be the very usual and typical *Schizothrix thelephoroides* Gom.), but he did not indicate its subspecific status. It is hoped that the new name, *S. Giuseppei*, will obviate the confusion and ambiguity of this peculiar situation. Specimens seen, PUERTO RICO: on limestone, Arecibo to Hatillo, *N. Wille 1392a*, Feb. 1915 (isotypes, C, FM). SONORA: on a gravel bank at foot of Sierra de Calera south of Villa de Seris, *Drouet & D. Richards 2937*, Nov. 1939 (FM).

HYDROCOLEUM **confluens** (Setch. & Gardn.) Drouet, **comb. nov.** *Microcoleus confluens* Setch. & Gardn. Univ. Calif. Publ. Bot. 6: 471, pl. 40. f. 25. 1918.—This species is undoubtedly a Hydrocoleum, with trichomes reminiscent of those of *H. lyngbyaceum* Gom. Specimens seen, CALIFORNIA: on rocks, Lands End, San Francisco, *N. L. Gardner 1641*, Jan. 1906 (TYPE in Herbarium of the University of California; isotype, FM), idem *3694*, Mar. 1917 (C, FM); on boards at high tide mark, Presidio, San Francisco, *Gardner 4481*, Nov. 1919 (C, FM).

PLECTONEMA **Cloverianum** Drouet, **sp. nov.** Stratum expansum ad dua millimetra crassum gelatinosum pannosum laete aerugineum, filis flexilibus, elongatis, compacte intertextis vel superne parallelis, in spiras laxas regulares contortis, haud raro irregulariter tortilibus interdum rectis, inferne sparse pseudo-ramosis; vaginis cylindraceis firmis, primum arctis et laevibus, aetate provecta crassioribus, chlorozincico iodurato laete caerulescentibus; trichomatibus circa 2 μ crassis, ad genicula constrictis (in speciminibus in formalina conservatis), ad apices quasi-capitatis non attenuatis; articulis diametro trichomatis usque ad quadruplo longioribus, ad apices brevioribus, dissepimentis binis granulis crassis vulgo notatis, protoplasmate passim granuloso; cellula apicali obovoidea, membrana superna non incrassata. Fig. 3.—On wet rocks and cliffs. The species is perhaps most closely related to *P. Nostocorum* Gom., but the trichomes are more robust and the filaments are characterized by the coiled habit noted above. *P. Cloverianum* is named in honor of Professor Elzada U. Clover of the University of Michigan. Specimens seen, COLORADO: on sandstone cliff near Dolores river, Montezuma county, *G. Piranian*, July 1935 (FM). UTAH: on limestone ledge on the south wall of the main canyon above Dark canyon rapids, Colorado river, San Juan county, *Clover & L. Jotter 35* (FM), *36* (TYPE in Herbarium of the University of Michigan; isotype, FM), July 1938.

LYNGBYA **Chungii** Drouet, **sp. nov.** Caespites violaceae usque ad 4 centimetra longae, lubricae, filis rectis saepe flexuosis, fragilibus; vaginis arctis, tenuibus, hyalinis, chlorozincico iodurato non aut vix caerulescentibus; trichomatibus pallide violaceis, 4 μ ad 6 μ crassis, ad genicula non aut passim leviter constrictis, ad apices non attenuatis; articulis subquadratis vel diametro usque duplo longioribus, dissepimentis non granulatis, protoplasmate non granuloso, cellula apicali rotundata, membrana superna leviter incrassata. —On rocks in marine waters. This new species is very similar to the epiphytic *L. gracilis* Gom., but the cells are much longer than

those of the latter species. It is named in honor of Professor H. H. Chung. Specimens seen, CHINA: on rock, seashore, Kulangsu, Amoy, Fukien province, *Chung A624*, July 1926 (TYPE in Herbarium of the University of California; isotype, FM), *Chung A594*, June 1926 (C).

LYNGBYA **Giuseppei** Drouet, **sp. nov.** Caespites ad tria centimetra altae, molles, aerugineae vel roseae, filis longis flexilibus; vaginis hyalinis papyraceis haud lamellosis, chlorozincico iodurato laete caerulescentibus; trichomatibus aerugineis vel pallide roseis, ad genicula leviter constrictis, ad apices non attenuatis, 5 μ ad 10 μ crassis; articulis curtis diametro 3–6-plo brevioribus, dissepimentis passim granulatis, protoplasmate tenui-granuloso; cellula apicali rotundata, membrana superna non aut vix incrassata. Fig. 8.—In fresh water. This species is somewhat similar to *L. putealis* Gom., but with shorter cells and less constricted trichomes. It is named in honor of Professor Giuseppe DeToni of Brescia. Specimens seen, NEW YORK: on brick and plaster sides of spring, Lebanon Springs, Columbia county, *A. K. Harrison*, Jan. 1895 (TYPE in herb. F. Drouet; isotype, F). MINNESOTA: attached to stones in aquaria in the zoological laboratory, Minneapolis, *J. E. Tilden*, Nov. 1894 (as *Symploca Muscorum* var. *rivularis* in Tild. Amer. Alg. 67, FM).

LYNGBYA **Patrickiana** Drouet, **sp. nov.** Caespites aerugineae ad 5 cm. altae molles, filis longis rectis fragilibus; vaginis primum membranaceis demum crassioribus et lamellosis, chlorozincico iodurato laete caerulescentibus; trichomatibus aerugineis cylindraceis, 5 μ ad 10 μ crassis, ad genicula haud constrictis, ad apices non attenuatis; articulis diametro 3–6-plo brevioribus, dissepimentis conspicuis, non aut subtiliter granulatis, protoplasmate tenui-granuloso; cellula apicali rotundata, membrana superna non aut vix incrassata. Fig. 10.—On rocks and wood in fresh water. This species is similar in general appearance to *L. Giuseppei* described above, but the sheaths are more robust, the trichomes never constricted, and the cross-walls not granulated. *L. Patrickiana* is named in honor of Dr. Ruth Patrick of the Academy of Natural Sciences, Philadelphia. Specimens seen; FLORIDA: about 10 miles from Hollywood on highway F149, Broward county, *Patrick*, 1939 (TYPE in Cryptogamic Herbarium of Field Museum); freshwater pool, region of Hendry creek about 10 miles south of Fort Myers, Lee county, *P. C. Standley 73246*, Mar. 1940 (FM). CEARA: on rocks in Rio Maceió near Mucuripe, Fortaleza, *S. Wright 2061*, Mar. 1937 (D).

LYNGBYA **guaymensis** Drouet, **sp. nov.** Fila inter alias algas subsalsas crescentia, longa, tortilia, plus minusve rigida, aeruginea, vaginis hyalinis, primum tenuibus demum crassioribus, ambitu saepe erosis, chlorozincico iodurato non caerulescentibus; trichomatibus aerugineis, 2 μ ad 4 μ crassis, ad genicula evidenter constrictis, ad apices non attenuatis; articulis diametro vulgo brevioribus raro subquadratis, dissepimentis non granulatis, protoplasmate haud granuloso; cellula apicali rotundata, membrana externa non incrassata. Fig. 9.—Growing in muck in brackish pools along the seashore. But for the rigid habit, the distinctly constricted trichomes, the reaction of the sheath to chlor-zinc-iodine, and the lack of granules at the cross-walls, this species is reminiscent of the freshwater *L. versicolor* Gom., to which it seems most closely related. The filaments are also somewhat similar to those of the epiphytic marine *L. Simmonsiae* (Coll.) Drouet and the marine *Plectonema Battersii* Gom. Specimens seen, SONORA: in the margin of a brackish pond, cove north of Cabo Arco, Guaymas, *Drouet & D. Richards 3344*, Dec. 1939 (TYPE in Cryptogamic Herbarium of Field Museum), idem *3338*, *3339*, *3341* (FM); in shallow brackish water of a sand pit on beach 4 km. east of Guaymas, *Drouet & Richards 3295*, *3296*, Dec. 1939 (FM). GUATEMALA: salt flat near San José, Dept. Escuintla, *P. C. Standley 63979*, Jan. 1939 (FM).

PHORMIDIUM **minnesotense** (Tild.) Drouet, **comb. nov.** *Oscillatoria minnesotensis* Tild. Amer. Alg. 6: 596. 1902. Stratum pulchre aerugineum tenue gelatinosum, vaginis diffluentibus hyalinis, chlorozincico iodurato haud caerulescentibus; trichomatibus aerugineis rigidis fragilibus rectis, compacte et paralleliter consociatis, 2 μ ad 3 μ crassis, ad genicula constrictis, ad apices non attenuatis; articulis subquadratis usque ad duplo brevioribus, dissepimentis non granulatis, protoplasmate homogeneo; cellula apicali rotundata, membrana superna non incrassata.—In shallow fresh water and on soil almost constantly wet with fresh water. The species belongs with other torulose members of the genus, perhaps next to *P. persicinum* Gom. Miss Tilden states that she described this as a species of Oscillatoria because the trichomes in the fresh material were oscillating rapidly; she here ascribes a property common to all species of the Oscillatoriaceae to those of a single genus. Specimens seen, TENNESSEE: greenhouse soil, Centennial park, Nashville, *H. C. Bold 164*, Oct. 1938 (FM). INDIANA: old bed of Whitewater river, Richmond, *L. J. King 81*, Sept. 1940 (FM). ILLINOIS: roadside ditch near Calumet lake, Chicago, *King & J. O. Young*, July

1941 (FM). MINNESOTA: on sides of a stone quarry under dripping water near university campus, Minneapolis, *G. Lilley*, Feb. 1902 (isotype in Tild. Amer. Alg. 596, FM). MISSOURI: margin of Goose lake 4 miles south of Clinton, Henry county, *C. Shoop & J. A. Steyermark 201*, Sept. 1938 (FM). NEBRASKA: emergent wet soil of pool, Lincoln, *W. Kiener 10174*, June 1941 (FM).

PHORMIDIUM **Groesbeckianum** Drouet, **sp. nov.** Stratum aerugineum tenue, saepe inter alias myxophyceas thermales crescens, vaginis hyalinis omnino diffluentibus, chlorozincico iodurato caerulescentibus; trichomatibus pallide aerugineis, rectis paralleliter consociatis, fragilibus, torulosis (aspectu trichomatum nostocaceorum), ad apices non attenuatis; articulis subsphaericis vel subdoliiformibus, diametro 2 μ ad 3 μ crassis, plus minusve subquadratis, dissepimentis non granulatis, protoplasmate haud granuloso; cellula apicali rotundata, membrana superna non incrassata. Fig. 7.—Forming gelatinous strata with other algae (often with *P. laminosum* Gom.) submerged and subaerial in hot springs. I have seen stray trichomes of this alga in collections from many hot springs in western North America, but the collection noted here is the only one in which the mass is sufficiently developed for description. The species is named in honor of M. J. Groesbeck, M. D., of Porterville, California. One specimen, NEVADA: in a hot spring (temperature 110° F), Steamboat and Reno hot springs, Washoe county, *Groesbeck 195a*, Sept. 1940 (TYPE in Cryptogamic Herbarium of Field Museum).

PHORMIDIUM **Steyermarkii** Drouet, **sp. nov.** Stratum gelatinosum laete aerugineum, saepe pulvinatum et calcareum, intus decoloratum, vaginis hyalinis omnino diffluentibus, chlorozincico iodurato non aut vix caerulescentibus; trichomatibus aerugineis rectis fragilibus paralleliter coalitis, 3 μ ad 4 μ crassis, ad genicula evidenter constrictis, ad apices non attenuatis; articulis doliiformibus vel fere cylindraceis, subquadratis vel diametro usque ad 1½–plo longioribus, dissepimentis non granulatis, protoplasmate haud granuloso; cellula apicali rotundata, membrana superna non incrassata. Fig. 11.—In the waters of hot springs. Morphologically, both *P. Steyermarkii* and the preceding *P. Groesbeckianum* are related to *P. foveolarum* Gom. The habit of this species is reminiscent of that of the anabaenoid state of *Hapalosiphon laminosus* Born. & Flah., but the trichomes appear to exist invariably as described above and to exhibit no transitional stages into typical *H. laminosus*. *Phormidium Steyermarkii* is named in honor of Dr. Julian A. Steyermark of Field Museum of Natural History. Specimens seen, GUATE-

MALA: Agua Caliente springs between La Fragua and Rio Motagua, Dept. Zacapa, *Steyermark 29211*, Oct. 1939 (TYPE in Cryptogamic Herbarium of Field Museum); in a hot spring and in pools of hot water, Laguna, Lake Amatitlan, *S. E. Meek 59, 72*, Jan. 1906 (FM).

PHORMIDIUM **californicum** Drouet, **sp. nov.** Stratum laete- vel atro-aerugineum, gelatinosum, late expansum, vaginis hyalinis, saepe plus minusve distinctis demum omnino diffluentibus, chlorozincico iodurato non caerulescentibus; trichomatibus aerugineis, dense et paralleliter consociatis, 3 μ ad 4 μ crassis, ad genicula constrictis, ad apices attenuatis et subacuminatis; articulis subcylindraceis vel subdoliiformibus, subquadratis vel diametro usque ad duplo longioribus, dissepimentis non granulatis, protoplasmate granuloso; cellula apicali conica, subacuta vel quasi-truncata. Fig. 12.—On woodwork, soil and other objects continuously wet with fresh water. The material placed here is very similar to that described elsewhere in this volume as *P. Weissii* Drouet, from brackish water along western Atlantic shores. The habitat, the general appearance of the stratum, the habit of the trichomes, and the reaction of the sheath-material with chlor-zinc-iodine are so different from those of *P. Weissii*, however, as to merit description as a new species. Specimens seen, CALIFORNIA: on a wooden bench in the conservatory, Golden Gate park, San Francisco, *Gardner 7766*, July 1935 (TYPE in Cryptogamic Herbarium of Field Museum; isotype, C), idem *6715*, July 1931 (C, FM), idem *7254, 7254a*, Apr. 1933 (C, FM), idem culture from the above, *7436*, Aug. 1933 (C, FM); on boards, Plath's greenhouse, San Francisco, *V. Duran 6588*, Jan. 1931 (C, FM). SONORA: in shallow water in an adobe pit 4 km. southwest of Villa de Seris, *Drouet, D. Richards, & L. D. Alvarado 2848*, Nov. 1939 (FM).

PHORMIDIUM **thermale** Drouet, **sp. nov.** Stratum gelatinosum late expansum laete aerugineum, vaginis hyalinis diffluentibus plus minusve fibrosis, chlorozincico iodurato non caerulescentibus; trichomatibus aerugineis rectis parallelis fragilibus, 2 μ ad 5 μ crassis, torulosis, ad apices abrupte acuminatis; articulis doliiformibus vel subcylindraceis, subquadratis vel diametro usque ad duplo longioribus, protoplasmate homogeneo; cellula apicali ad basem rotundata, superne abrupte et saepe oblique acutissima. Fig. 13.—In warm water of hot springs. Except for the peculiar apical cells the trichomes are very similar to those of the anabaenoid growth-form of *Hapalosiphon laminosus*. *Phormidium thermale* is placed in the vicinity of *P. Weissii* Drouet and *P. californicum* Drouet, from

which it differs conspicuously in size of trichome and in configuration of the apical cell. Specimens seen, CALIFORNIA: Seigler hot springs, Lake county, *N. L. Gardner 7463*, Aug. 1933 (TYPE in Cryptogamic Herbarium of Field Museum; isotype, C); in warm pools, the Geysers, Sonoma county, *Gardner 7509*, Aug. 1933 (C, FM), idem *Gardner & L. Bonar 7529*, Aug. 1933 (C, FM, and distributed as *Hapalosiphon laminosus*), idem *Gardner & V. Duran 7704*, Apr. 1934 (C, FM, and distributed as *H. laminosus*).

PHORMIDIUM **Hancockii** (Drouet) Drouet, **comb. nov.** *Schizothrix Hancockii* Drouet Hancock Pacific Exped. 3 (2): 22, fig. 15. 1936. *S. Hancockii* f. *submersa* Drouet ibid. 3 (2): 23. 1936.—Further studies of the original material of this species shows that the structure of the sheath and of the stratum is that of a Phormidium rather than of a Schizothrix. *Phormidium Hancockii* is placed near *P. papyraceum* Gom.

PHORMIDIUM **Richardsii** Drouet, **sp. nov.** Stratum pannosum, fuscum vel roseum vel aerugineum, tenue, fragile, vaginis tenuibus saepe omnino diffluentibus, hyalinis, chlorozincico iodurato haud caerulescentibus; trichomatibus aerugineis 3 μ ad 7 μ crassis, longis parallelis flexilibus, ad genicula interdum leviter constrictis, ad apices longe attenuatis et acutis; articulis brevibus, diametro 6-plo brevioribus usque ad subquadratis, dissepimentis granulatis, protoplasmate tenui-granuloso vel homogeneo; cellula apicali longe et plus minusve acute (haud raro acutissime) conica, nonnumquam curvata. Fig. 15.—On barren soil intermittently wet with fresh water. The trichomes are reminiscent of those of *Oscillatoria brevis* Gom.; specimens are easily confused with juvenile masses of *Microcoleus vaginatus* Gom. and *M. lacustris* Gom. found in recently denuded ground, the filaments of which contain only one trichome within a sheath. This new species is named in honor of Mr. Donald Richards of the University of Chicago. Specimens seen, MONTANA: roadside pit 24 miles north of Millegan, Cascade county, *F. H. Rose 4160*, May 1941 (FM). NEW MEXICO: on drying mud flats in the city park, Hot Springs, Sierra county, *Drouet & Richards 2702*, Oct. 1939 (TYPE in Cryptogamic Herbarium of Field Museum), idem *2704*, *2708*, *2705* (FM); on denuded ground near the Rio Grande bridge, Hot Springs, Sierra county, *Drouet & Richards 2707*, Oct. (FM).

PHORMIDIUM **Standleyi** Drouet, **sp. nov.** Stratum late expansum pulvinatum gelatinosum, atroviolaceum vel aerugineum, ad dua centimetra altum, vaginis hyalinis tenuibus demum omnino diffluen-

tibus, chlorozincico iodurato non caerulescentibus; trichomatibus aerugineis vel violaceis, 5 μ ad 7 μ crassis, ad genicula haud constrictis, ad apices non attenuatis; cellulis diametro 6–3-plo brevioribus, dissepimentis granulatis, protoplasmate granuloso; cellula apicali depresso-rotundata, membranam plus minusve incrassatam praebenti. Fig. 14.—Growing in thick mats in warm water of hot springs. This species is most nearly related morphologically to *P. ambiguum* Gom. It is named in honor of Mr. Paul C. Standley of Field Museum of Natural History. One collection seen, GUATEMALA: in warm water of hot spring, Baños de San Lorenzo near Tejar, Dept. Sacatepéquez, *Standley 59840*, Dec. 1938 (TYPE in Cryptogamic Herbarium of Field Museum).

PHORMIDIUM **hydrocoleoides** Drouet, **sp. nov.** Stratum aerugineum, tenue, vaginis hyalinis diffluentibus, chlorozincico iodurato aegre caerulescentibus; trichomatibus laete aerugineis, rectis, fragilibus, 5 μ ad 8 μ crassis, ad genicula leviter constrictis, ad apices attenuatis et capitatis; articulis diametro 2–5-plo brevioribus, dissepimentis granulatis, protoplasmate tenui-granuloso, cellula apicali capitata, calyptram depresso-hemisphaericam praebenti. Fig. 18.—On mud in brackish or almost salt water. The trichomes are somewhat reminiscent of those of *Hydrocoleum lyngbyaceum* Gom., but smaller and very different in color and granulation. The species is to be placed near the freshwater *Phormidium lucidum* Gom. One specimen, SONORA: on tidal flat along Rio Mayo on north side of Yavaros, southwest of Huatabampo, *Drouet & D. Richards 3220*, Dec. 1939 (TYPE in Cryptogamic Herbarium of Field Museum).

PHORMIDIUM **Gardnerianum** Drouet, **sp. nov.** Stratum laete aerugineum, tenue, fragile, vaginis diffluentibus, hyalinis, chlorozincico iodurato haud caerulescentibus; trichomatibus longis, flexilibus, 4 μ ad 6 μ crassis, ad genicula constrictis, ad apices longe attenuatis et capitatis, apicibus uncinatis; articulis subquadratis vel diametro usque ad duplo brevioribus, dissepimentis parce granulatis, protoplasmate pallide aerugineo, tenui-granuloso, cellula apicali capitata, membranam incrassatam rotundatam aut depresso-conicam praebenti. Fig. 17.—In marine waters. This species, except for the constricted trichomes, closely resembles the freshwater *P. uncinatum* Gom. It is named in honor of the late Professor Nathaniel Lyon Gardner of the University of California. One collection, CALIFORNIA: in a jar of sea water, University of California, Berkeley, *Gardner 2179*, 1910 (TYPE in Cryptogamic Herbarium of Field Museum; isotype, C).

OSCILLATORIA **sonorensis** Drouet, **sp. nov.** Stratum tenue, fragile, laete aerugineum, trichomatibus longis, rectis, 3 μ ad 5 μ crassis, aerugineis, ad genicula vix constrictis, ad apices abrupte attenuatis et curvatis; articulis quadratis vel diametro usque ad duplo longioribus, dissepimentis conspicuis haud granulatis, protoplasmate homogeneo, cellula apicali longe conica, acuta, curvata. Fig. 16.—In marine or almost marine water. This species is rather similar to the thermal *O. acuminata* Gom., but differs markedly in the type of granulation of the protoplasm and in its less attenuate and acuminate apices of the trichomes. One collection, SONORA: in a tide pool on muddy shore of bay near the refrigerating plant, Empalme, *Drouet & D. Richards 3419*, Dec. 1939 (TYPE in Cryptogamic Herbarium of Field Museum).

ARTHROSPIRA **Khannae** Drouet & J. C. Strickland, **sp. nov.** Trichomata planctonica in flore-aquae crescentia, aeruginea, in spiram laxam amplissimam diametro circa 20 μ contorta, ad genicula haud constricta, ad apices leviter attenuata et subcapitata, 3 μ ad 5 μ crassa; anfractubus circa 20 μ inter se distantibus; articulis brevibus, diametro 3-plo brevioribus usque ad subquadratis, dissepimentis granulatis, protoplasmate pseudovacuolas grandes continenti. Fig. 6.— Planktonic in bodies of fresh water. This species is similar in many respects to *A. platensis* Gom. but conspicuously smaller in size. It is named in honor of Professor L. P. Khanna of University College, Rangoon. Specimens seen, BURMA: pond near the zoological garden, Rangoon, *Khanna 698*, Apr. 1937 (TYPE in Cryptogamic Herbarium of Field Museum), idem *697* (FM); Agricultural Gardens, Rangoon, *Khanna 714*, May 1937 (FM).

SPIRULINA **Weissii** Drouet, **sp. nov.** Trichomata 3 μ ad 4 μ crassa, inter alias algas plus minusve paralleliter agglomerata, fragilis, recta vel irregulariter curvata, in spiram regularem densam diametro 10 μ ad 12 μ contorta; anfractubus contiguis vel subcontiguis; protoplasmate grosse-granuloso. Fig. 19.—In brackish water. The spiral habit of this species is similar to that of *S. subsalsa* Gom., but the trichomes are much larger than those of the latter. It is named in honor of Mr. Philip Weiss Wolle of Princess Anne, Maryland. One collection, MARYLAND: in shallow pools of brackish water, Jericho marshes west of Fairmount, Somerset county, *Drouet & Wolle 3650*, July 1940 (TYPE in Cryptogamic Herbarium of Field Museum).

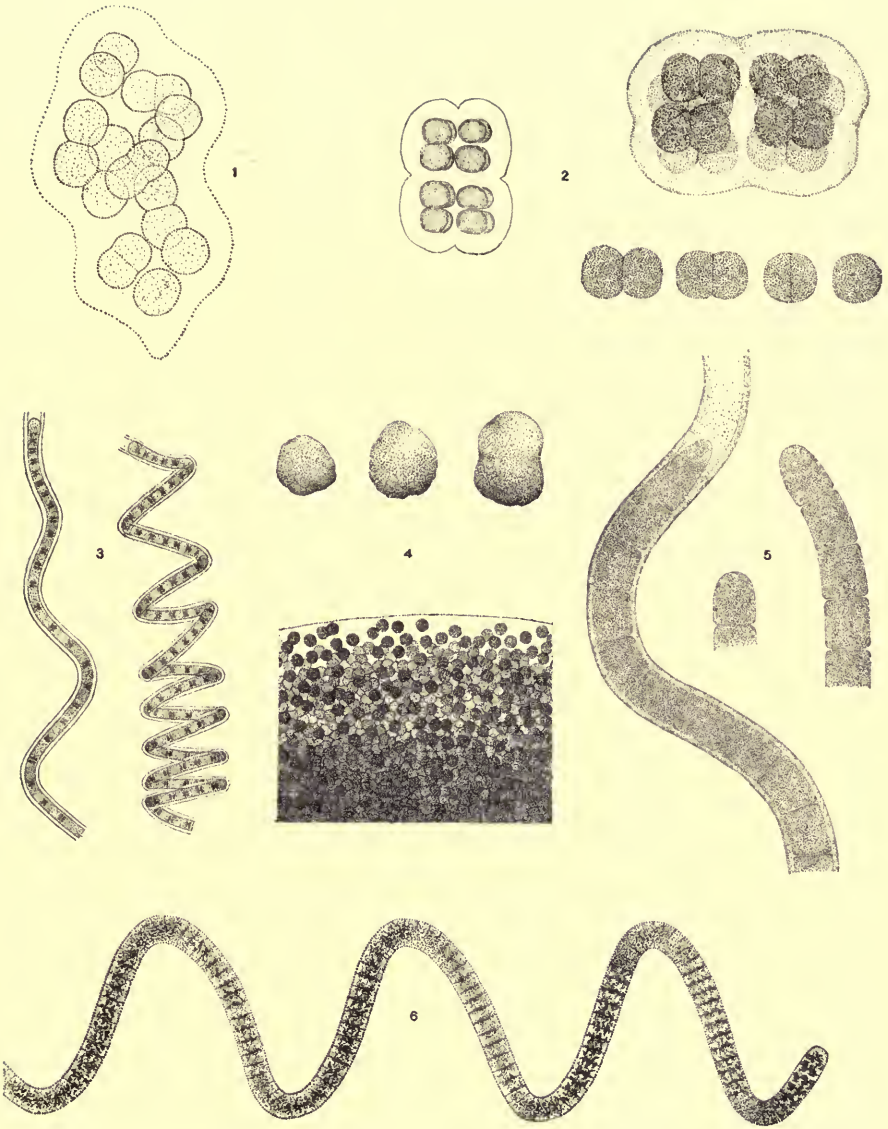

Plate I. Fig. 1. *Chroococcus sonorensis.* Fig. 2. *C. Prescottii,* two plants and several cells in division. Fig. 3. *Plectonema Cloverianum.* Fig. 4. *Aphanocapsa Farlowiana,* habit of plants above and arrangement of cells below. Fig. 5. *Porphyrosiphon Velasquezii,* details of filament and trichomes, the apices in various stages of growth. Fig. 6. *Arthrospira Khannae.* All drawn from type material by Raymond Taran except for the smaller plant of Fig. 2, which was made by William A. and Fay K. Daily.

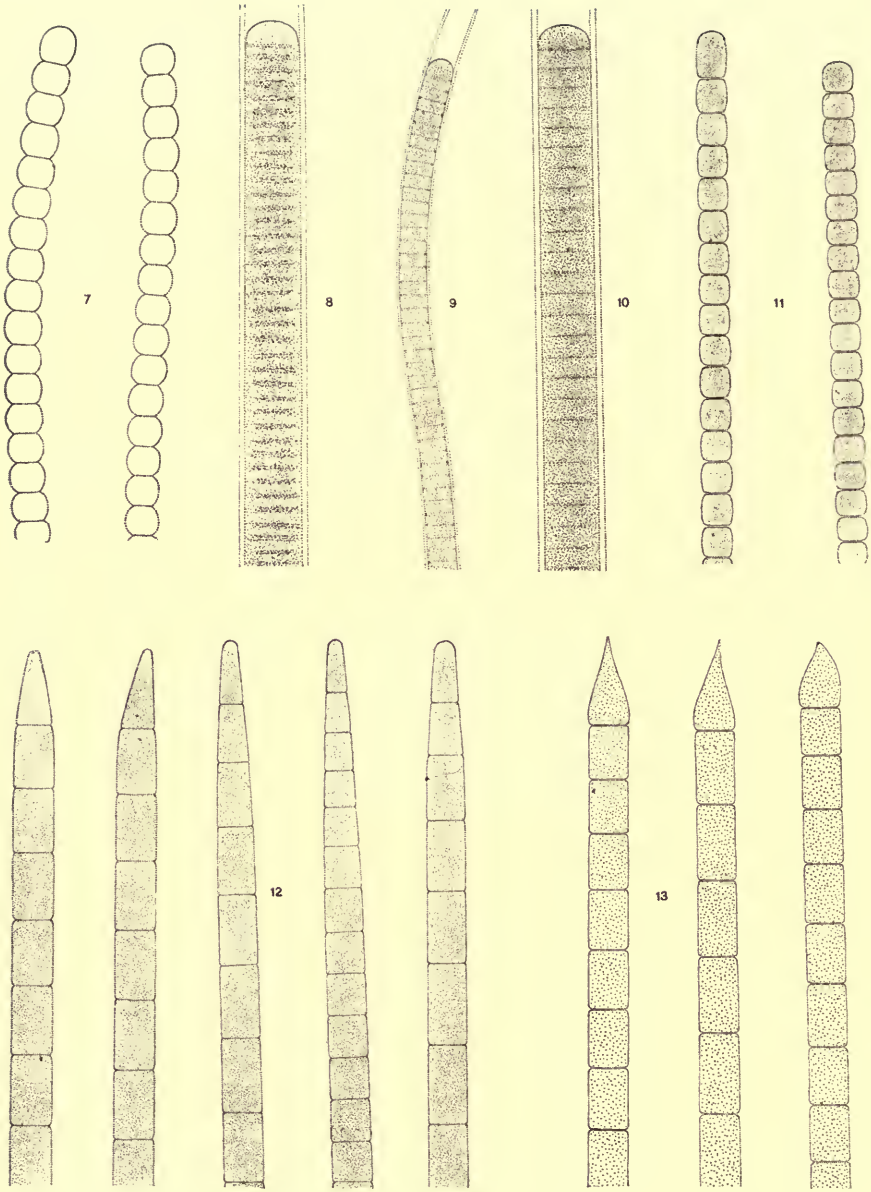

Plate II. Fig. 7. *Phormidium Groesbeckianum*, two trichomes. Fig. 8. *Lyngbya Giuseppei*. Fig. 9. *L. guaymensis*. Fig. 10. *L. Patrickiana*. Fig. 11. *Phormidium Steyermarkii*. Fig. 12. *P. californicum*, five trichomes. Fig. 13. *P. thermale*, three trichomes. All drawn from type material by Raymond Taran.

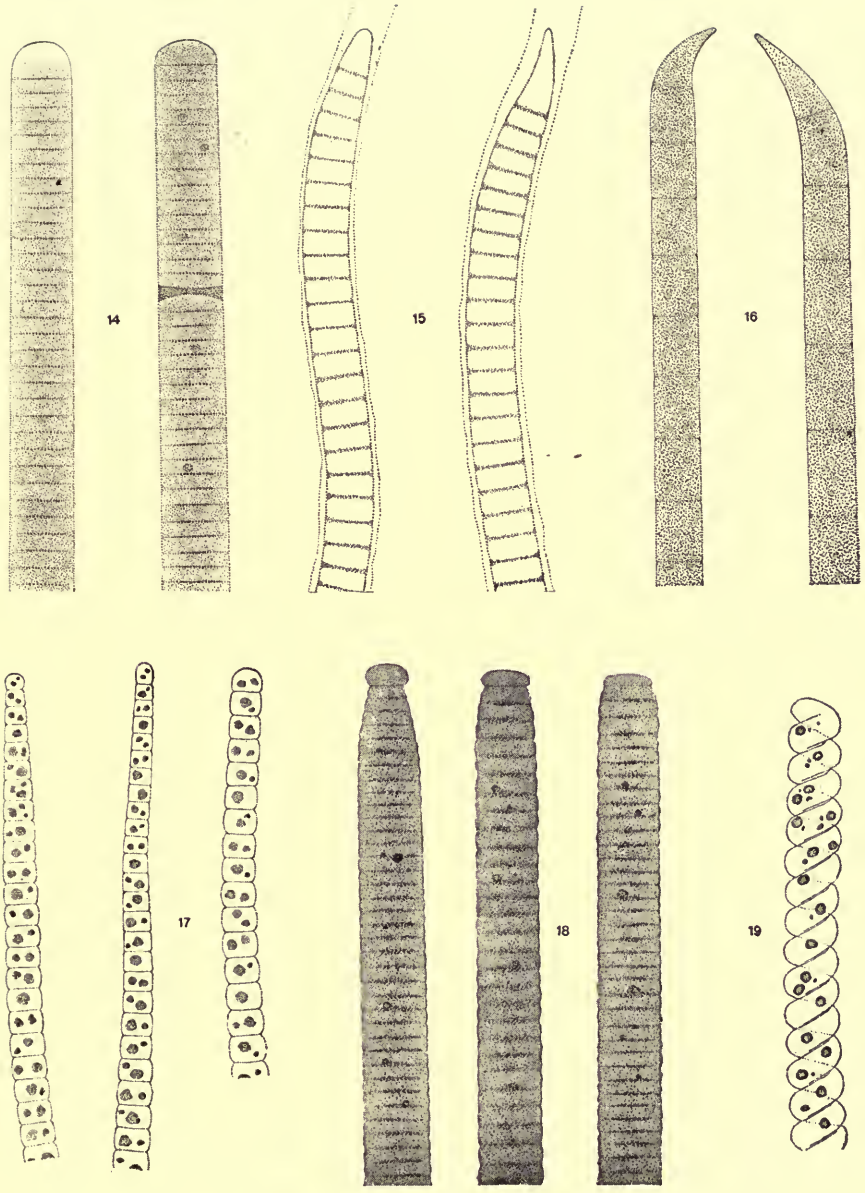

Plate III. Fig. 14. *Phormidium Standleyi*, two trichomes. Fig. 15. *P. Richardsii*, two filaments. Fig. 16. *Oscillatoria sonorensis*, two trichomes. Fig. 17. *Phormidium Gardnerianum*, three trichomes. Fig. 18. *P. hydrocoleoides*, three trichomes. Fig. 19. *Spirulina Weissii*. All drawn from type material by Raymond Taran.

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